SPECIFICATION

TITLE OF INVENTION: TIE BLOCK RETAINER AND TIE BLOCK SLEEVE FOR RAILWAY TIES WITH INSERTED BLOCKS

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References Cited

U.S. PATENT DOCUMENTS

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FIELD OF INVENTION

The present invention pertains to field of devices for supporting the rails of a railway.

BACKGROUND OF THE INVENTION

Ballastless railway track systems with independent booted blocks provide remarkable improvement of track/train interaction. Their installations in the Euro-tunnel between France and United Kingdom, and on twenty rapid transit and railroad track systems worldwide provide unprecedented reduction of track maintenance. This is accomplished by high levels of dynamic dampening and by the additional level of track resiliency inherent to the booted block concept.

In prior art, these advantages are restricted to the track systems with independent booted blocks where concrete tunnel inverts and bridge slabs exist to provide firm structural foundations. However, similar booted blocks placed in railway ties (sleepers) have a potential to improve ballasted track as well. Some of the early devices patented by Mc Court, H.L.Prater, Harmsen, Vanotti, Beigl, Pratter, Vanhonacker, Farese, and Mc Callum could serve this purpose if technologically updated. However, the prior art does not restrict the vertical travel of the blocks at resonant frequencies, and does not facilitate lifting the ties by rails during the mechanized track installation and maintenance. The prior art would allow the blocks to bounce uncontrollably at critical speed ranges, and the rail lifting during track installation and maintenance will withdraw the blocks from the ties, leaving the ties in place.

The spread of stray currents is a major contributor to the deterioration of utility lines and metal components of structures found near electrified railways, especially when direct current traction power is used. A major part of the stray currents' volume bypasses insulators through the water layer that exists on the surfaces of wet rail fasteners, insulators, tie blocks and ties, especially in rainy weather. The problem of the stray currents can be alleviated by using track insulation members with overhangs such as the ones commonly used on power lines that interrupt the surface water layer.

ABSTRACT

Releasable tie block retainers are attached to the main body of a typical tie (1) with two inserted tie blocks (2). The main body of a typical tie (1) includes two recesses to receive two independent tie blocks (2), preferably enclosed in rubber boots (4), equipped with standard rail fasteners (7) and protected with hard standard rail pads (5), wherein one tie block (2) is placed under each running rail (3). A bottom elastomer (6) is preferably used and located inside the boot under the tie block. The tie block retainer assemblies, consisting of components (8) thru (16), keep the tie blocks in the tie main body (1) when the tie is lifted by rails while allowing a small movement of the blocks upward to provide rail float. Also, the releasable tie block retainers restrict the vertical travel of the tie blocks at resonant loading frequencies.

In order to decrease the current leakage, a non-metallic insulating tie block sleeve (12) overhanging the edge of the tie block and sloping down is incorporated to insulate the rails.

SUMMARY OF THE INVENTION

Releasable block retainer assemblies (8 through 16) prevent the tie block (2) from being pulled out of the main body of the tie (1) when the tie is lifted by the running rail (3) during track installation and maintenance. Also, tie block retaining assemblies restrict its vertical movement at resonant frequencies. However, a small vertical movement is allowed and elastic restrain is provided to facilitate the rail float. The rail float allows a slight upward movement of the rail with attached tie blocks during the uplift phase of the rail deflection, while leaving the main body of the tie (1) in place. The interface of the tie's bottom plane and the supporting ballast thus remains undisturbed so that the track geometry deterioration and track maintenance intensity are reduced. The accuracy of the vertical travel control is enhanced by the optional features (14) and (15) that provide controllable mating surfaces on the top of the retained tie blocks (2).

The releasing and retaining portion of the tie block retainer is thread-less to eliminate maintenance-intensive loosening corroded threaded components.

The pin (11) and retaining elements of the tie block retainer (9) and (10) can be readily removed to allow a complete withdrawal of blocks and boots from the tie for quality control, maintenance, or replacement of tie blocks, boots and otherwise inaccessible elastomers.

The tie block sleeve is an optional non-metallic collar (12) that is attached on the top of the tie block (2) to provide a dry area under its overhang. The surface leakage of stray electric currents is interrupted by the dry area.

The tie block retainer is designed to span over the tie block sleeve.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

Fig. 1 includes the elevation, crossection and plan view of tie block retainers and tie block sleeves installed on a concrete tie with tie blocks for use on ballasted track.

Fig. 2 includes elevation, crossection and plan view of the tie block retainers and tie block sleeves installed on a steel tie with tie blocks for use on ballasted track.

Fig. 3 includes a Detail of Section I-I and the tie block retainer assemblies cast in a concrete tie, and the tie block sleeve.

Fig. 4 includes Detail of Section II-II and the tie block retainer assemblies installed on a steel tie, and the tie block sleeve.

Fig. 5 includes plan view relevant to the tie block retainer assemblies, and the tie block sleeve

DETAILED DESCRIPTION OF THE INVENTION

The tie block retainer (8) is attached to the main body of a typical tie (1) by its anchoring protrusion cast into the main body of a concrete tie (1) shown on Fig. 1. The tie block retainer (16) is attached by bolted steel to steel connection to the main body of a steel tie (1) shown on Fig. 2. Except for this connection, the tie block retainer is thread-less. Flat leaf springs (9) and (10) are inserted into a curved slot in a metallic insert (8) and (16). During installation, the lower leaf spring (9) is inserted first, and then the upper leaf (10) is driven in. It deflects and causes the leaf (9) to deflect as well. The leaves (9) and (10) stay within the slot due to the introduced pre-load. An eventual shifting of the leaves that would loosen the plates is prevented by the pin (11) inserted into the aligned holes in the leaves (9) and (10) and in shoulders (8) and (16). For enhanced accuracy, the contact surface on the tie block's top (2) can be lowered or raised by inserting an adjustable thickness member (14) into the slot created by two members (15).

The pin (11) and the leaf springs (9) and (10) can be readily removed to allow a complete withdrawal of the tie block from the tie for quality control, maintenance or replacement.

Large components of the ties that support the tie block retainers, and the withdrawal of tie blocks, boots and elastomers have been described in the Abstract and Description of the Invention. Also, they are apparent from Figures 1 and 2.